Description

The invention relates to a spray head in accordance with the generic term of patent claim 1.

In stationary de-icing medium spray devices, e.g. at airports and highway viaducts, a large number of spray heads, in each case with one or more nozzles, are arranged along an area to be sprayed (see e.g. CH-PS 658 411, Fig. 4). At highways such heads are attached e.g. to guard rail posts. It is also known to arrange the spray heads in a section of the pavement not traveled on, resting upon the same. The spray heads and/or the nozzles arranged therein are supplied with the de-icing medium via controllable valves, in order to spray it on the pavement.

The well-known spray heads have the disadvantage that these heads are relatively frequently damaged. With the heads attached to the guard rail posts, the damage is caused most frequently by the impact of an automobile at the guard rail post; with the heads located on the pavement however damage takes place most frequently during snow removal.

In FR-E-18 209 a spray head for water, which is sunk into the pavement, is shown. This is designed however as one piece and it is very difficult to maintain. It can also spray only a relatively small area.

It is therefore the task of the invention to create a spray head, which does not exhibit these disadvantages. This is achieved with a spray head of the kind initially specified with the characteristic features of patent claim 1.

The spray nozzle body sinkable in the pavement and the arrangement of the nozzle and the outlet hole for the de-icing medium on or below the pavement level creates a spray head, which can be damaged neither by vehicle accidents nor by snow removal machines. The spray head can be sunk up to the outlet hole into the pavement surface. The spray head consists of a bottom part and a cover which can be rolled over, which allows easy access to the connections to the de-icing medium line and the nozzles; both during the installation and for service and repair work. Preferably the de-icing medium is piped through channels built within the cover and the bottom part of the spray head. In a further preferably design variation the bottom part is designed as an actual tub, in which is room for further installations, e.g. for the controllable valve. Preferably an additional hydro reservoir is arranged in this tub, which stores a certain amount of de-icing medium under pressure. This de-icing medium is sprayed through the controllable valve and the nozzle on the pavement, if a de-icing medium application is required. The arrangement of the installations in the bottom part of the spray head results in a compact unit, which is optimally protected from damages and nevertheless well accessible.

Design examples of the invention are in the following described in more details using the figures. Shown is in

Figure 1 a sectional view through a first embodiment of the spray head with bottom part and cover;

Figure 2 a top view on the bottom part of figure 1;

Figure 3 a top view on the cover of figure 1;

Figure 4 a sectional view through the tub-shaped bottom part and the cover of a further embodiment;

Figure 5 a top view on the tub of figure 4;

Figure 6 a hydraulic schematic diagram of the embodiment according to figure 4.

Figure 1 shows a spray head sunk in the pavement 1 in a section. The pavement is thereby only suggested and not shown with its well-known layer structure. In order to give an approximate representation of the actual proportions of size, a height of the spray head of 60 mm can be assumed as example. A suitable recess must be planned in the pavement. The spray head consists of a bottom part 2 and a cover 3. The bottom part 2 (actual diameter 260 mm) is shown in figure 2 in a top view, the cover 3 in figure 3. A lateral opening 6 and a chamber 7 are intended in the bottom part 2. Through the opening 6 - only schematically represented - the de-icing medium line 5 (pipe or hose) placed into the pavement is inserted into the bottom part. The de-icing medium line provided with a suitable connection piece is connected by means of a connecting thread 9 to the bent upward de-icing medium channel 8 of the bottom part 2. The bottom part 2 exhibits one recess limited by the edge 10, in which the cover 3 can be arranged. The surface of the cover 3 is thereby essentially aligned with the upper edge of the edge 10 and/or with the pavement surface. In the center of the circular bottom part 2 and/or the cover 3 a drill hole 14 is intended for the mounting of a threaded bolt with countersunk head. This bolt at the bottom part can localize the cover. If the cover is not localized, then it can be rotated around the axis of the drill hole 14. A circular de-icing medium channel 12 is intended in the cover 3, which is connected to the channel 8 of the bottom part 2. One or – as shown – multiple well-known nozzles 16 lead on the one hand into the channel 12 and on the other hand in each case into an outlet hole 17 in the cover 3. The nozzle and the outlet hole are slanted upward and form with the horizontal plane an angle alpha of approx. 10 degrees. In the example shown seven nozzles 16 are intended, which are arranged in each case offset with approx. 18 degrees. The throw direction of the de-icing medium can be adjusted by rotating the cover 3 around the axis 14. Several gaskets 18 are intended between

cover and bottom part. The cover 3 and the bottom part 2 are designed so that they can be rolled over, i.e. that they withstand the loads, which result, if a vehicle or an airplane rolls over the spraying body or if a vehicle or an airplane remains standing on it. Cover and bottom part thereby can be manufactured from stainless steel, from aluminum or glass-fiber reinforced synthetic. In particular for pavements the surface of the cover 3 should be designed just as rough as the road surface, in order to create no danger for single-track vehicles rolling over it.

The function of the spray head is the same as with well-known spray heads. De-icing medium is conducted via the channels 8 and 12 to the nozzles 16 and ejected by these when opening the controllable valve of the de-icing medium spray device. After a pre-determined time interval the controllable valve closes, and the spraying is aborted.

Figure 4 shows a further design example in a sectional view; figure 5 shows a top view onto the bottom part of this design. First however the hydraulic design of this design example is described using figure 6. Two cover elements of the spray head are termed with 20 and 21, which correspond essentially in each case to the cover 3 described so far, thus exhibit at least one nozzle and one outlet hole. Controllable valves associated in each case are termed with 22 and 23. 24 and 25 are two hydro reservoirs. These components are well known. They store a certain amount of de-icing medium under pressure. The de-icing medium is located thereby in the liquid space 32 of the pressurized reservoir 24 and/or 25, whose area is separated from a gas space 30 by means of a flexible diaphragm. Said gas space can be filled with gas of pre-determined pressure through a valve 31. The hydro reservoirs are filled from the de-icing medium line 27 through a non-return valve 26 with de-icing medium, until a pressure balance between gas space and liquid space of each hydro reservoir is achieved. These reservoirs contain now a defined amount of de-icing medium under pressure. For the yield of the de-icing medium on the pavement now one of the valves 22, 23, or both valves are opened. The hydro reservoirs empty themselves through the nozzles due to the gas pressure. After that the valves 22, 23 are closed and the hydro reservoirs are filled again with de-icing medium from line 27. The benefits of such an arrangement were described in a European patent application on 26 May 1990, submitted by the same applicant as the present application.

Figures 4 and 5 show now a spray head, into which the mentioned hydraulic components are integrated. This spray head exhibits a bottom part, which is designed as tub 42. That cover element is made of three pieces and comprises a first piece 33, which rests upon the edge of the tub. This cover element exhibits two recesses, into which in each case the cover element 20 and/or 21 are put in. These cover elements are designed the same as the cover element 3 of figures 1 to 3. In figure 4 these cover elements 20, 21 are shown in each case above the suitable recess in the cover element 33. The de-icing medium conduction in the cover 33, 20, 21 takes place in each case through a channel 38 in element 33 into an in each case circular-shaped channel 52 in the elements 20, 21 and to the nozzles 36. The localization of the elements of 20, 21 at the element 33 takes place in each case by means of a threaded bolt sunk in a central tapped hole 44. Thus also the circular cover elements 20, 21 can be rotated in the cover element 33, if the threaded bolt is loosened, in order to adjust the throw direction for the de-icing medium.

The installations are arranged in the tub in accordance with figure 6. In figures 4 and 5 these installations are represented only schematically. Of course also another spatial arrangement is possible. In place of the two reservoirs 24, 25 also only one, but larger, hydro reservoir can be used. In a de-icing medium spray device without hydro reservoirs also only the valves 22, 23 can be arranged in the tub 42. This can be the case also, if hydro reservoirs are arranged in a separate cabinet at the side of the road.

A spray head with two spraying plates 20, 21, no matter if with tub-shaped installation bottom part or with normal bottom part 2, is suitable in particular for applications at airports, since the de-icing medium must be yielded there wider than on roads. On roads, in particular on highways, a desired significant entrainment of the de-icing medium occurs through the high vehicle density, which guarantees its even distribution even with larger distances between the spray heads. With two spraying plates however the spray head can already achieve a good area coveage with de-icing medium.

The design examples shown offer an easy adjustability of the throw direction for the de-icing medium as well as a good accessibility from above for installation and maintenance work. Of course other variations are possible, in which the whole spraying body is sunk in the pavement, and the pavement surface covers the spraying body with the exception for an opening for the de-icing medium ejection. Such design examples however are not low-maintenance.